Volkswagen Cabriolet
DIY Guide: Digifant Performance Modifications

Originally posted at http://fuelie.tripod.com/tuneup.htm, aka Ken's Digifant Pages for A2 chassis Volkswagens.

There are lots of hot rodder's tricks that will work on Digifant engines. Porting, polishing, machining, blueprinting etc. are all possible but are outside the scope of the discussions here. Here we talk about what you can do under the shade tree.

Engine Swaps
It is possible to swap the 1.8 liter short block out from under your Digifant head and replace it with a 2.0 liter short block either from a 1988 - 1992 Audi 80 (engine code 3A) or a 1993 - 1999 VW A3 (engine code ABA). Such a swap should be good for at least 15 extra horsepower and a real seat-of-the-pants torque boost even if you do nothing else. This swap plus other mods could push you towards 150 horsepower.

There is reference to this and many other potential VW engine swaps at David Marshall's VW Engine Swap Page.

Any engine can respond to a modified camshaft and a low restriction exhaust system. Aftermarket cams and exhaust systems abound that will allow the engine to pass more air and fuel.

Cams
Aftermarket camshafts will allow you to shift around your engine's torque curve. But would you want to? Due to its aggressive ignition map, the Digifant 1.8L has a torque hole at just off idle. This is the root cause of the infamous Digifant hesitation. I suspect even a mild cam will shift the torque peak up enough to make the low speed hesitation worse. Solutions might involve an aftermarket computer module customized to your cam or an adjustable cam sprocket. The latter would be something of a nuisance if you have your cam set for everyday driving but suddenly need the power high up.

Exhaust
Digifant cars with the RV engine are fitted from the factory with a slightly more restrictive four-into-one exhaust manifold that yields 100 horsepower. Cars with the PF engine are fitted with the slightly less restrictive four-into-two manifold (the so-called double downpipe) which yields 105 hp.

Installing a PF exhaust manifold on an RV engine is worth 5 horsepower. Unfortunately that exhaust conversion also requires changing the catalytic converter.

Again, the aftermarket has systems from the exhaust ports to the tailpipe if you want to spend the money.

Computer Chips
Chip tuning has been problematic as the Digifant system uses two control units. Digifant computer replacements are available from the aftermarket, which claim to increase power while eliminating hesitation on step-off. The AMS Digiprom is one rather expensive solution, although with time the cost has dropped. The few reports on the AMS system that have appeared in Usenet are generally favorable.

Drilling Out the Airbox
Drilling numerous holes in the A2 airbox has been a popular way to increase air flow in the belief that performance will improve. Without back-to-back measurements such modifications are impossible to verify since these changes are not detectable by the seat of the pants.

What actually does increase with a drilled-out airbox is noise. That un-muffled moooing sound may convince the naive that they are going faster.

Before you attack your airbox, consider this: the airbox plays a crucial role in cold starting by diverting air preheated by the exhaust manifold into the intake. If you cut holes in the airbox you will defeat the cold start preheat function. Starting, idle and driveability will suffer in colder weather. Worse, you may cause the throttle to freeze open. VW has a recall campaign running in Canada for just this problem. And that's with unmodified air boxes. I suspect VW will look unkindly on fixing your swiss-cheezed airbox.

And that's not the end of it. In hot weather a drilled airbox will actually reduce power by pulling heated air from under the hood instead of the cooler (and denser) outside air.

So, with the exception of increased noise, drilling the airbox would appear to be a losing, or at least a no-gain proposition. In very cold weather may even be dangerous.

Removing the Intake Snorkel
A less permanent intake modification involves removing the resonator snorkel from the airbox. You have to take the airbox out of the car and then pry out the snorkel. This greatly increases the size of the air intake and can actually improve throttle response on your Digifant car if it is otherwise in good condition.

Naturally, the carefully engineered noise dampening characteristics of the intake have now been circumvented and your car will moo on acceleration. But who knows? You might like the way it sounds.

With the snorkel out, the airbox will now be open to undesirably hot underhood air. With an empty 4 liter (~1 gallon) plastic windshield washer jug, a pair of scissors and the inevitable roll of duct tape, you should be able to fashion a short tube to install between the back of the headlight surround and the airbox opening. This will keep the cool air coming in.

Bear in mind that you will want to re-install the resonator snorkel for the winter as you will have effectively disabled the cold start pre-heat function of the airbox by removing it. That could be dangerous.

Fiddling With the Air Flow Sensor
Later Digifant cars appear to be tuned to run lean from the factory. The common tweak of adjusting the idle mixture at the air flow sensor (AFS) to "cream up" throttle response makes no difference because of Lambda feedback (you are just "centering" the adjustment).

One tweak which is known to L-Jetronic tuners and that can work on the Digifant cars is to slightly loosen the spring tension on the air flow sensor.

By reducing the spring tension on the AFS you are essentially allowing more air to flow into the intake for a given throttle position. This "tricks" the computer into supplying more fuel at lower RPM, in effect richening the mixture throughout the range up to about 4,000 RPM when the AFS is wide open anyway.

Reducing AFS Spring Tension
To reduce the spring tension, first remove the black plastic cover on the air flow sensor by cutting up through the silicone sealer with a sharp blade. You will see, among other things, a black gear-wheel on top of what looks like a clock spring. A wire clip engages a tooth on the gear-wheel and is held in place by a 7 mm screw.

Scribe a permanent mark on the gear-wheel at the tooth where the wire clip engages (This is so you can go back to the stock setting if need be).

This is the tricky bit: Get a good grip on the gear wheel with your fingers. Loosen the 7 mm screw and wire clip assembly. Don't drop anything, and whatever you do, don't let go of that spring, or you may never get the car to run correctly again!

Now, carefully unwind the gear-wheel 3 teeth counter-clockwise. This is no more than 8 or 9 mm, so be careful. Reset the wire clip three teeth to the loose side of stock. Tighten down the 7 mm screw, replace the black cover with a thin bead of silicone sealer and you're done.

I tried one, three, and five teeth... one didn't seem to do much, five actually reduced power. Three was just right. Stay with three teeth because the down side of too rich a mixture will be increased emissions, and possible damage to the O2 sensor and/or catalytic converter. YMMV.

I can report that this tweak helps solves some perceived Digifant driveability problems (assuming all else is in order). Hesitation is reduced, throttle response is crisper, and there is mildly quicker acceleration in the lower gears due to increased torque. Gas mileage does not appear to suffer much.

Caveat Emptor

Remember, no modifications will succeed if the Digifant system is not in good working order to begin with. In reality, experience will show that the perceived advantage of possibly expensive modifications will quickly disappear when you become used to the slight increase in performance afforded by the modification. In other words, speed is addictive: The faster you go, the faster you'll want to go. The hot rodder's question has always been "How fast can you afford to go?"